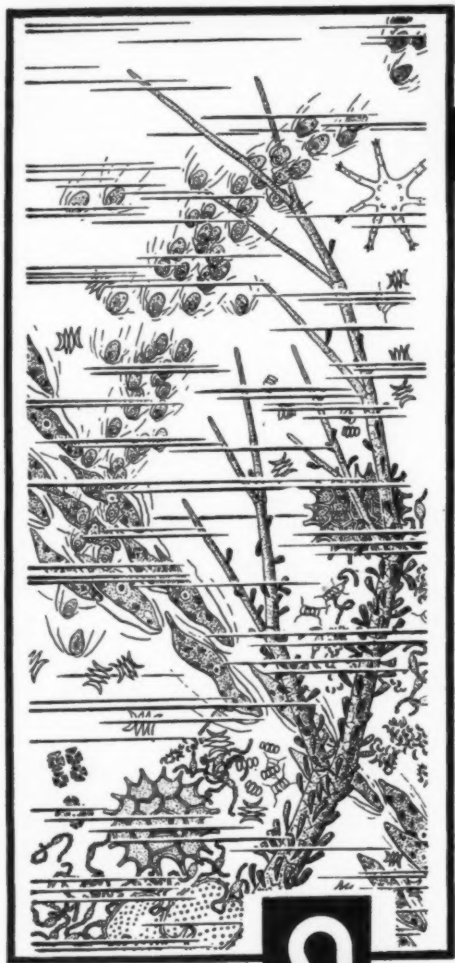

OCTOBER 1941

The Story of Ed Ogg

SOIL CONSERVATION

M. Clifford Townsend, who directs the Office of Agricultural Defense Relations, discusses the defense responsibilities of the Department of Agriculture. The Department, as he remarks, is "the point of assembly to which the Nation's farmers may bring their problems for solution." Page 97.

UNITED STATES DEPARTMENT OF AGRICULTURE – WASHINGTON

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WELLINGTON BRINK
EDITOR

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SOIL CONSERVATION

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Chief, Soil Conservation Service

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A NEW CROP FOR THE OLD FARM

By WILLIAM C. PRYOR [1]

IF YOU hear them talking down South about crop rotations of bass-bass-corn-alfalfa, don't be alarmed—they're fixing to grow a new crop on the farms in Dixie.

This new crop, believe it or not, is fish!

It sounds like a big jump, from cotton to carp, but that's what they are figuring on. And it fits right in with home production of foodstuffs, considered so important in complete conservation farming, and in the "food for defense" program and the fight for better nutrition in America.

Eventually, they hope, fish will become a new cash crop for the South—one which, under the rotation system, will improve the land instead of exhaust it as cotton, corn, and tobacco have done. A year or two of flooding a field between other crops should be very good for the soil.

In the meantime, some southern farm families are eating a little better than they used to—because in addition to pork, black-eyed peas, okra, and other vegetables they also may have as a regular part of their diet fish from their own "gardens."

It is by no means a new idea, this production of fish on the farms and the rotation of fish and grain or other vegetative crops on the same land. Farmers in many parts of France have been doing it for centuries. But it is relatively new in the United States, so new that although the purely experimental work is completed, it is still in the proving stage.

It all started about 8 years ago. Dr. H. S. Swingle and Dr. E. V. Smith, of the Alabama Agricultural Experiment Station, were members of a fishing club at Auburn, Ala. This was a good club. It had a good membership and a fine, large pond to fish in. In fact, it had everything—except fish. And no matter what club officials did, no matter what recommendations of what Federal and State experts they followed, the result still was the same: No fish they could brag about to other anglers, no fish worth mentioning, even. So Dr. Swingle and Dr. Smith decided to see what they could do.

After planning and discussion, a farm fish pond project was set up at the Alabama Agricultural Experiment Station and Swingle and Smith went to work. It is common knowledge among biologists that one of the basic diets of aquatic animals is plankton, the mass of floating organisms, both plant and animal, that live in water, so Swingle and Smith started with the plankton.

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Many young fish live largely on phytoplankton, floating microscopic plants which are classed as algae, and so do the minute crustaceans and water insects which are found in practically all bodies of water. Larger fish live on smaller fish, on the insects and crustaceans, and to less extent on the phytoplankton. So Swingle and Smith reasoned that the supply of phytoplankton was the key to the situation.

Since the phytoplankton is composed of plants, they felt that it might be worth while to try fertilization in order to increase production of this basic food.

Laboratory experiments were carefully charted and carried out; as a result they learned that 6–8–4 commercial fertilizer plus some additional nitrate of soda was the best way to increase growth of phytoplankton. After that they started field experiments in a series of 20 ponds on the Experiment Station grounds. Then they found that 100 pounds of 6–8–4 and 10 pounds of nitrate per acre of surface water is the proper amount of fertilizer to get the best results. The amount can be increased up to eight times the recommended amount without danger, but more than that is likely to result in somuch phytoplankton that fish production is set back.

What happens is that when the microscopic plants increase to such extreme numbers, they start to decay, using up so much oxygen from the water that there is not enough for the fish and for other animal life on which the adult fish largely subsist.

Fertilization is usually started about April and stopped about October. Fertilizers are applied simply. They are merely thrown into the pond from the edge, and analyses show that the plant nutrients are generally completely absorbed within 24 to 48 hours.

Fertilizer is applied to the fish pond as often as needed, and you can tell when it is needed simply by looking at the water: if you can see the bottom of the pond in a foot and a half of water near the shore, there isn't enough phytoplankton. If, on the other hand, the water is a murky green with these microscopic plants so that you *can't* see the bottom, then there's enough.

Of course, you have to "plant" your pond with fish, too. Experiments in Alabama have been carried out mainly with bream and bass, although carp has been tried successfully too. Ponds are stocked with 1,500 bream and 100 bass to the acre of water surface. Farmers may obtain fish to stock their ponds from the United States Fish and Wildlife Service or perhaps from State conservation agencies, although some States do not furnish fish for private ponds. Soil conservation districts often can work out advantageous arrangements for obtaining fish for a number of cooperators from the Federal Service which allows certain priorities to agencies cooperating with the Government.

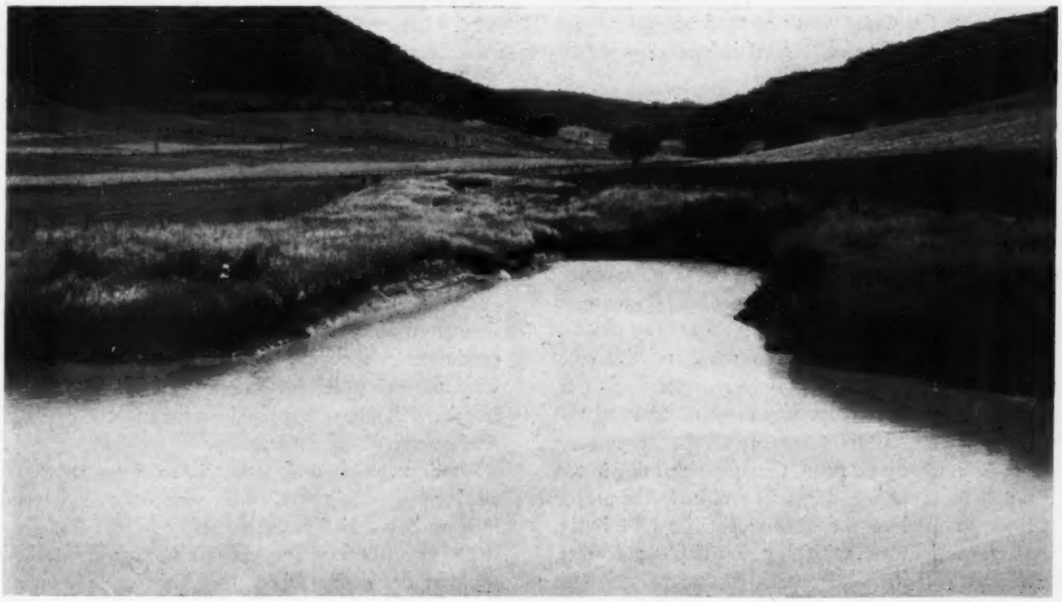
Ponds stocked with 1,500 bream and 100 bass to the surface acre, during the Swingle-Smith experiments, were found to produce annually from 500 to 600 pounds of fish per acre, at a cost of around 3 to 6 cents a pound. And where can you buy beef that cheap?

Incidentally, 500 pounds of fish per acre per year isn't hay. In the Les Dombes region of France where farmers have been following the fish and grain rotation for at least four centuries—it was well established when the first written account appeared in 1570—interesting records have been kept.

On one representative pond of 450 acres, fish production was 146 pounds per acre annually from 1850 to 1880, and since 1880 it has averaged 164 pounds per acre. Beef production on pasture in the same area has averaged only 149 pounds per acre per year.

And here is a word of warning: Don't stock a pond indiscriminately as to number or species of fish. If 1,500 bream and 100 bass are good, it doesn't necessarily follow that 3,000 bream and 200 bass, with perhaps a few catfish thrown in, will be twice as good. If there are too many fish and too many species there will not be enough food, and most of the fish will not grow to worth-while size. Bass 4 years old may be only 3 or 4 inches long if there is not enough food for them.

Controlling a gully by damming the head, a practice recommended in many parts of the country, produces a pond capable of developing good fishing.



And now, about those "other conditions":

Let's take area and depth first: Experiments have proved that the Swingle-Smith system will work perfectly well on ponds anywhere from 1/130th of an acre—a mere 15 by 22 feet or thereabouts—to 30 acres or more! It is essential, however, that the ponds have an average minimum depth of 5 feet or more, since shallower ponds are too likely to become choked with submergent or emergent water plants. There should be as little shallow water as possible, and that only around the edges of the pond.

And that brings us to cleanliness: Shores of the ponds, at least in the Southeastern States, must be kept free from plant growth. The larvae of the malarial mosquito develop readily in shallow water, especially where they find shelter in plant material or debris. Larvae of other mosquitoes present a similar problem in other regions. Top minnows which feed on these larvae are unable to get them if there is any amount of such debris around the pond edge. If the edge is kept clean, the larger fish, such as bass and bream, will dispose of the mosquito larvae.

Hundreds of farms, of course, have ponds with few or no fish in them. The reason often is too many water plants. Well, you might not believe it, but the experimenters have found in their research that the same old 6-8-4 will solve that problem, too. To do this, you simply apply the fertilizer in the late fall and winter instead of spring and summer. What happens is this: Fertilization of the pond at that time of year produces tremendous quantities of filamentous algae, which cover the water weeds so thoroughly that the weeds are killed through lack of light and in a few weeks may be eliminated.

Another point is that the pond should have a drain. This might be needed, for instance, if it were necessary to remove some of the fish. A pond that is too crowded with fish is not productive, since none of the fish can grow to proper size.

The ideal way, of course, to keep the fish in the pond down is to fish the pond regularly, but few people do that. Dr. Swingle maintains that most fish-pond owners do not fish their ponds as thoroughly as they should.

Fish, it seems, are now a farm crop, and this crop should be harvested as regularly and thoroughly as any other perennial crop, if you want to keep the crop coming on. If you "harvest" all the fish you can each season from your pond, the ones remaining in the pond at the season's end usually will be in the proper balance to produce the same quantities of fish the next year. Nature, with her invariable processes, takes care of that.

Bass, of course, will keep the bream down to some extent, but bream reproduce on an amazing scale and the bass can't do it all. So removal of bream by fishing is necessary, and likewise removal of bass, although, left to their own resources, bass have not multiplied so rapidly.

Now, if using 6-8-4 to grow a crop of bass still sounds like a "fish story" or like something from one of Walt Disney's Silly Symphonies, look at these "case histories."

In one particular pond, a total of 1,580 bream had been caught in the 5 years prior to fertilizing; in the first 6 months after fertilization, 1,612 bream had been caught and by the end of the first year, 2,038 bream. In the same 5 years before fertilization, the catch had been 1,506 catfish, and in the first year afterward, 1,762 catfish were taken.

There is another pond near Auburn, a 12-acre one, which is fished by 60 families, and each family has all the fish it can use from that pond during the year at a cost of $13 per family per year. Careful study of the records, according to Dr. Swingle, indicates that the pond, however, is not being fished to capacity.

"Twice as many," he says, "a hundred and twenty families—could fish that pond regularly, and get as much as they wanted, and the cost would be cut and there would actually be better fishing from it."

Drs. Swingle and Smith are not satisfied with their results. They are continuing their studies. They hope to improve bass fishing, possibly through addition of another species to the bream-bass combination.

They hope to discover a fish which can be profitably used for commercial production on the farm—a new "cash crop."

They hope also to modify fertilizers so as to reduce cost, and they are studying the renovation of old ponds which cannot be drained.

Application of the Swingle-Smith system in other parts of the country will present, of course, other problems, which will have to be tackled by scientists in those other regions. One of these problems is the effect of climate. Slightly lower temperatures and shorter growing seasons in Northern States may affect production, although there now seems to be no reason why the principles established by the Alabama researchers should not apply anywhere in the country, subject to regional variations.

Water pollution, as in industrial sections, and excess alkali, as in certain parts of the west, of course would have to be avoided or corrected.

The effect of mud and silt will need to be studied, too. In the region where the Alabama experiments

In ponds that are too shallow, emergent water plants may develop, effectively preventing fish production.

have been conducted, soils have been largely sandy with a resultant minimum of silt, so that problem has not been encountered in serious proportions.

The value of what Drs. Swingle and Smith have done, and the importance of continuing the study, however, is readily apparent.

Diet deficiencies are especially evident in the Southeast, but they exist everywhere and with startling frequency on farms. More production of foods rich in proteins and other elements is being urged upon the nation.

Increased intake of proteins would be of great benefit to the rural South and to a large segment of the nation's population. Fish are a rich and valuable source of proteins and phosphorus, and at a production cost of 3 to 6 cents a pound are certainly one of the most economical. Fresh-water fish also contain small amounts of vitamin B_1 and riboflavin, known as vitamin G; iron, and calcium; potash, and water.

Obviously, farm fish ponds as a supplementary food source have tremendous possibilities. From the standpoint of the rural sportsman they have still another value.

They are considered so important from the standpoint of a well-rounded conservation program that the Soil Conservation Service has established a number of demonstration ponds and is including fish ponds in many farm plans in the South.

Viewed as a commercial production proposition—a new dual-purpose crop, which may eventually be used in soil-enriching rotations with grain or forage crops—they assume a new importance in the program to make farmers of the South and of the nation more self-sufficient through conservation farming.

POSTSCRIPT TO "SNOW WATER"

Interesting in connection with the article, Snow Water, in the July 1941 issue is a paragraph in a recent letter from A. T. Mitchelson, acting chief, division of irrigation, Soil Conservation Service, Berkeley, Calif., to M. L. Nichols, assistant chief of the Service, in charge of research. The letter pertains to storage in the Elephant Butte Reservoir. Writes Mr. Mitchelson:

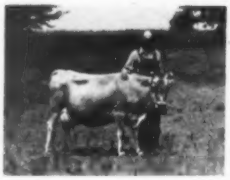
"You will note that the actual river discharge into the reservoir was only 1 percent out of line with the forecast made by the division in our snow survey work. You will appreciate this more fully, I am sure, when you realize that this Elephant Butte forecast was a result of a special survey made after the close of the regular snow season and because of the anxiety of the State officials and the Bureau of Reclamation engineers regarding spill from the reservoir."

The forecast of storage was 1,941,000 acre-feet, which, as stated, was "only 1 percent out of line."

Ed Ogg believes the sorghum strip helps to protect the corn at the right from chinch bugs.

MAN, LAND, OPPORTUNITY AND MANAGEMENT—SUCCESS

By CHARLES G. WEBB [1]



Ed Ogg and old Molly, who is mother, grandmother and great-grandmother of the cattle owned by Ogg. They are standing in outlet channel sodded to Bermuda grass.

GIVE a man or a piece of farm land a chance and both will make good. That is the opinion of Edmond A. Ogg, 45-year-old Muskogee, Okla., tenant farmer and erstwhile WPA laborer. In the past 6 years, lanky, lean, and hard-working Ed Ogg has proved his opinion sound.

By the standards of many, Ed Ogg still is not financially well-to-do, nor is the 140-acre farm he operates a soil and water conservation show place; but both the farmer and the farm have progressed—the farmer away from relief labor to security and independence, and the land from serious soil erosion and misuse toward conservation and wise use. Today, with confidence, Ed Ogg is seeking a larger farm that he can operate under a complete soil and water conservation system. He wants a farm with its cultivated land protected from erosion by contour cultivation, strip crops, terraces, and good crop rotation—a farm with lush Bermuda grass and clover pastures where old Molly, Jersey matriarch of his herd of 19 cattle, can grow fat and contented—a farm that will produce all the feed needed for his cattle, work stock, hogs, turkeys, and chickens. He not only wants this farm, but he expects to find it, or to help create it with his own labor.

Six years ago Ed Ogg and his stepmother who manages his home for him did not have cattle, horses, mules, hogs, turkeys, and chickens. They did not have a cotton crop, good for 15 bales on 24.6 acres, or corn that will average 16 bushels to the acre in spite of heavy rains—he planted some of the corn crop four times before he got a good stand. Back in those days—in 1935 when he and his stepmother moved to Muskogee County—Ed Ogg had only old Molly, the grade Jersey cow now 9 years old, an old truck, and $35 in cash. It took $17 of the $35 to register the truck; and old Molly was in the keeping of a brother near Tulsa. Thus, actually, Ed Ogg had only $18 in cash and the truck, plus a willingness to work and a determination to get ahead. He worked, worked hard as a WPA laborer in the rock quarry for the Soil Conservation Service demonstration project in the Pecan Creek watershed near Muskogee. He lived in a small house on the W. C. Stone farm which was under a soil and water conservation agreement with the demonstration project. He paid the rent on the house by working 2 days a month for Stone. He remained on relief work during 1936, when old Molly was moved to the farm on which he was living.

In 1937—and here the Ogg fortunes began to look upward—Ed Ogg rented 50 acres on the J. R. Parks farm for $50. He continued as a WPA worker but he had been advanced from laborer to grader operator. He hired a neighbor's team to cultivate his crops which yielded 5 tons of hegari, 125 bushels of corn, and one-half bale of cotton. In the meantime

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he had obtained the foundation for a flock of chickens by buying 100 chicks. Late that autumn he gave up the Parks farm—rented another 80-acre farm and bought the team and the farming tools of the previous tenant by assuming a $127.50 note at the bank. He became a conservation farmer in 1938 when he assumed the responsibility for carrying out the 5-year conservation agreement on this farm with the Pecan Creek watershed project.

Ogg recalls that little conservation work had been done on the farm when he went there. He constructed terraces, established strip crops and adopted rotations which included sweetclover and cowpeas. He constructed and helped to sod to Bermuda grass an outlet channel emptying into the 5-acre pasture on the farm. Although he made no especial effort to establish Bermuda grass in this small pasture, today a considerable stand of it can be seen there—Ogg said he would have mowed the pasture had he owned a mower.

In 1938 Ogg harvested 300 bushels of corn and 7 bales of cotton from the 44 acres of cultivated land. He bought a team of bred mares and traded a .22 caliber rifle for a purebred Poland-China gilt. With the exception of his salary during 4 months' work as a WPA grader operator on the demonstration project, all of his income during 1938 came from the farm.

The following year, Ogg rented an adjacent 60-acre farm, which gave him 56.6 acres of additional cropland. His harvest that year was 300 bushels of corn, 15 bales of cotton, 28 tons of prairie hay and 170 bushels of oats. By the fall of 1939 his inventory showed 13 dairy cows, 10 hogs, 3 mares, 3 colts, 1 horse, 10 turkeys, and 100 chickens. He had obtained the turkeys by trading 2 bushels of cottonseed for 20 turkey eggs. From August 12 to November 12 that year, he marketed $116 worth of chickens, eggs, and cream — an average of nearly $40 per month.

In 1939 conservation farming practices were established on the additional rented land. Some of the first channel-type terraces constructed in the Pecan Creek watershed were on this land.

Misfortune dogged Ogg's steps in 1940 when midsummer hail destroyed his entire cotton and corn crops. He did not gather a pound of cotton that fall. Two days before the hail, however, he had finished threshing a 1,236-bushel oat crop, and this together with the accumulation of livestock served to cushion the loss. He sold four surplus work animals to pay off all except $154 of his loan at the bank. The sale of livestock and livestock products made it possible for him to produce his 1941 crop. Between January 1, 1941, and mid-August, the sale of cream averaged about $10 per week, Ogg estimated; and during August, when eight cows were being milked, the weekly cream check ranged from $12.50 to $13. He also had sold four 6-weeks old pigs for $40 and four 6-months old pigs for $80.

Today the former WPA laborer has livestock which he values at $1,200. This includes 19 head of cattle; 4 grown work animals; 3 young work animals; 2 brood sows, 2 hogs that will be slaughtered this fall, and 8 pigs; 250 White Leghorn chickens, and 60 turkeys. His crops this year are 45 acres of corn, 24.6 acres of cotton, 2 acres of cane, 8 acres of hegari, 2 acres of black-eyed peas, 5 acres of sweetclover in strip crops, and 2 acres of lespedeza.

Ogg has carried out a conservation farming plan to the best of his ability under circumstances which might have defeated a less determined man. He has been handicapped by lack of equipment. For example, he sowed the 5 acres of sweetclover strip crops by hand. He has not had a mower with which to improve

Here we see the subject of this article among his cows, pigs, and poultry.

Ed Ogg, Oklahoma farmer.

the pasture. A major obstacle to his livestock program was the lack of water. Since Ogg went to this farm in 1938 he has had to haul water approximately 1 mile for the livestock.

This tenant farmer recently has been seeking another farm because 80 acres of the land he has been operating has changed ownership. Ogg believes that the land brought a better price for having received conservation treatment. His landlord once said that conservation practices had increased the value of the farm $1,000.

"I don't want to rent anything except a conservation treated farm or one the owner is willing to help me protect from erosion and build up," Ogg said. "I just turned down a 480-acre farm that I could have rented. It had good barns, good water, and the owner was willing to spend $200 or $300 on the house, but the land was washing away.

"I want to make my own pastures with clovers, lespedeza and Bermuda grass and fertilizer, and I want to keep the soil in the fields and make it better soil."

Ed Ogg is convinced that there should be the closest cooperation between landlord and tenant in establishing and maintaining a conservation farming system.

"You can't expect to get conservation on the land if the landlord and the tenant want to get every dollar they can out of the land and not put anything back," he declared. "The tenant should have an opportunity to build up the land with clovers, peas, lespedeza and by spreading manure. If you give the land a chance it will come back, and if you give a man a chance he will make good."

Just as this article goes to press, word comes that Ogg has rented a 160-acre farm near Muskogee, Okla., in the Muskogee-Okmulgee Soil Conservation District. The owner has observed Ogg's work during the past 5 years and offered to rent the farm to Ogg as soon as he learned the tenant would have to move.

The farm has no conservation practices on it now. It will be placed under agreement with the district, and Ogg will receive every cooperation from the landlord in carrying out the conservation plan. The rental agreement is the customary 1-year, third-and-fourth lease (one-third of the feed crop and one-fourth of the cotton to the landlord). However, Ogg and the owner have a verbal agreement that if the landlord-tenant relationships are satisfactory the first year, they will enter into a long-term agreement for the operation of the farm for the production of livestock. Under such a plan, Ogg would have a one-half interest in the livestock and would benefit most from the conservation program.

DISTRICT PLANS FOR WILDLIFE

In the near future, farmers cooperating with the Fenton Soil Conservation District in Michigan may have a detailed wildlife management plan for their farms, as well as general soil erosion control plans. This is by virtue of an understanding with the directors of the Fenton district under which the Michigan State Conservation Department prepares the plans for wildlife management.

Early last spring, J. H. Skinner, chairman of the Fenton district, reported that 26 wildlife management plans had been drawn and included as a part of the district agreements with farmers.

The Fenton district embraces a portion of the old Livingston County soil and water conservation demonstration project. This area, as well as adjoining areas within the district boundaries, is endowed with many natural lakes and marshlands. Moreover, the countryside is spotted with small woodland patches, hedgerows, stone fences, and clumps of shrubbery—all conducive to excellent wildlife habitats. To offset these natural wildlife advantages, farmers have permitted some "burning over." Also, the area is surrounded by numerous cities, whence come many hunters. Biologists know that wildlife needs encouragement.

AGRICULTURE'S CLEARINGHOUSE FOR DEFENSE ACTIVITIES

By M. CLIFFORD TOWNSEND

Director, Office of Agricultural Defense Relations, United States Department of Agriculture

WHEN the President set up the National Defense Advisory Commission in May 1940, he very properly included a representative for agriculture among the seven commissioners named. At that time, there was no lend-lease bill. At that time, our defense program was a modest effort compared to the giant objectives on which we now have set our sights. At that time, this Nation had not yet awakened to the full peril of the Hitler menace.

At that time, agriculture looked at its overflowing elevators, bins, and warehouses, at the new surpluses piled up by the loss of foreign markets, at its great productive plant, and decided that from the viewpoint of national defense and national safety, American farmers were more than prepared to meet the emergency. And I believe they were right—at that time.

But in this war-torn world of "blitzkrieg" tactics and double-crossing statesmanship, the picture changes rapidly and as it does, so do our national responsibilities. As things grew darker overseas, we were forced to recast our entire defense effort. In December 1940, the President set an even greater goal for the defense program than just the rearmament of the United States when he pledged that this country "must be the great arsenal of democracy."

To help meet this additional demand, the President, in January 1941, enlarged the administrative structure directing the defense effort by creating the Office of Production Management, and providing for the coordination of the activities of the National Defense Advisory Commission, the OPM, and other defense agencies through the Office for Emergency Management. The OEM was designed to serve as the extra eyes, hands, and brains of the President, and in this set-up the agricultural representative on the National Defense Advisory Commission continued to function.

With the passage of the lend-lease bill and the inclusion of agricultural products in the list of supplies to be made available to the nations resisting aggression, it soon became apparent that agriculture had an "action" part to play in the defense program comparable to that of industry's. Unlike industry with its trade associations and comparatively few producers, unlike labor with its unions and collective bargaining system, agriculture has no national nongovernmental unity embracing each of its 6 million farms except that inherent in programs administered through the Department of Agriculture.

The Department has been the natural place, the point of assembly, to which the Nation's farmers may bring their problems for solution. The Department works with farm organizations and with unorganized farmers; with the one-horse man and the tractor owner; with the farmer as a producer and with the farmer as a consumer.

This work has been implemented in the last 8 years by the setting up by Congress of the legislative machinery whereby all of the Nation's farmers can unite in national agricultural programs. That machinery, including, among other agencies, the Agricultural Adjustment Administration, Soil Conservation Service, the Farm Security, Surplus Marketing and Rural Electrification Administrations, all operates through the Department of Agriculture.

Thus it was that when agriculture's job in defense shifted to an "action" basis, the President made the logical move when, on last May 5, he transferred to the Secretary of Agriculture those functions that previously were assigned to the National Defense Advisory Commission. In transferring the duties, he asked that an "Office for Agricultural Defense Relations" be established within the office of the Secretary of Agriculture.

In his letter to the Secretary, the President said:

MY DEAR MR. SECRETARY: As emergency defense activities continue to develop and expand, I am deeply concerned that adequate provision be made for the correlation of agricultural operations with other elements of the national defense program. Up to the present time, the principal responsibility for bringing agricultural activities into proper focus in relation to defense has been vested in the Division of Agriculture of the National Defense Advisory Commission. With the aim of further strengthening the emergency organization for defense, I believe it now desirable to place these special defense activities directly in the Department of Agriculture where they will be brought closer to the established agricultural programs of the Government.

Accordingly, I am placing in the Department of Agriculture, effective May 5, 1941, those functions which were previously assigned to the Division of Agriculture of the National Defense Advisory Commission. To provide for the conduct of these func-

tions, it is my desire that you establish within your immediate office an "Office for Agricultural Defense Relations." This Office, directed by a responsible official and consisting of a small group of policy and liaison persons, should not only continue those activities previously performed by the Division of Agriculture but should also assist you in carrying out the defense activities now located in the Department.

In requesting the creation of this Office, I am taking the position that, broadly conceived, the most vital operating functions of agriculture in the defense program, are first, the guarantee of an adequate supply of food for the needs of this Nation and supplemental needs of those nations whose defense is essential to the defense of this country; and second, the provision of sufficient agricultural raw materials for expanded defense production. In the accomplishment of these major purposes, it will be necessary to assure that the agricultural balance is not destroyed and that the consequent ability of the agricultural population to fulfill its contribution to the defense effort is not impaired.

With this concept of the role of agriculture in defense, I suggest that the Office for Agricultural Defense Relations perform the following duties under your supervision:

1. Serve as a clearing house to bring into common focus the consideration of agricultural needs and problems as they relate to the defense program;

2. Facilitate the coordination of defense operations carried on by the various bureaus and agencies of the Department of Agriculture;

3. Assist the Secretary in the maintenance of effective channels of communication between the Department of Agriculture and the several agencies of the Office for Emergency Management, the Departments of War and Navy, and other defense agencies, with respect to problems of procurement, production, priorities, price, and other activities involving agricultural considerations;

4. Assist in the planning of adjustments in the agricultural program in order to meet defense needs.

Even though located within the Department of Agriculture and responsible directly to you, this special Office should be considered an integral part of the emergency defense organization. In this role, the Office will be in a strategic position to work and cooperate with the several units of the Office for Emergency Management, the War and Navy Departments, and other defense agencies.

Very sincerely yours,

Franklin D. Roosevelt.

Needless to say, we are attempting to carry out the wishes of the President and the Secretary to the best of our ability. We are not, however, attempting to carry out administratively any of the "action" programs. We are purely a planning, advisory, policy-making, liaison unit which serves as a clearing house for consideration of agricultural needs as they relate to defense. For example, we helped decide that increased production of soybeans for oil was advisable, but the actual carrying out of that program is a job for the Agricultural Adjustment Administration and the Commodity Credit Corporation.

In setting up our unit, we tried to make it small and at the same time broad enough to cover as many agricultural problems growing out of defense as we could foresee. We finally decided that most of our problems are likely to fall under four general headings—production, farm equipment and supplies, rural labor, transportation and marketing—and with this in view we have set up four divisions to deal with these matters.

Our Production Division is responsible for securing from the Army, the Navy, the Purchasing Division of the Office of Production Management, and the various agencies within the Department, the military, lend-lease and domestic demands for agricultural products including food, fats and oils, cotton, wool and other agricultural fibres, forest products, certain drugs, and leather. It is this division's job to work with the various "action" agencies to adjust production and acquisition of these products so as to meet demand.

The Farm Equipment and Supplies Division is responsible for helping to secure priorities for agriculture. This field will include metals for farm equipment and for plants processing farm products; chemicals for agricultural uses, such as fertilizers, insecticides and fungicides; petroleum products and other materials needed to maintain the farm plant.

The Labor and Rural Industries Division is responsible for developing and planning programs, in cooperation with existing agencies, to assist in handling farm labor problems. This division also reviews and analyzes requests for the location of military establishments, and consults with the Labor Division of the Office of Production Management on all labor relations involving agriculture.

The Transportation and Marketing Division is responsible for securing transportation, warehousing, packaging and marketing facilities for agricultural products and supplies. It works in close cooperation with the Transportation Division of the Office for Emergency Management, the Interstate Commerce Commission and agricultural agencies.

That is a general picture of the OADR'S physical set-up. In order to get the full picture of what is being done, however, it is necessary to look at agriculture's defense contributions as a whole without regard to agencies or bureaus. Even before the formal transfer of agriculture's defense responsibilities to the Secretary of Agriculture, the Department had launched a Nation-wide food-for-defense program.

That program is a part—one of the most important parts—of our all-out defense effort. Food is a defense weapon, one of the strongest we have. Without food, Britain and the other nations resisting aggression cannot continue to stand between the United States and the Hitler menace.

Under the plan, the Department of Agriculture has promised to support certain average prices for dairy products, hogs, chickens, and eggs. At the same

time, the Department intends to maintain feed prices at levels which should make profitable for farmers the conversion of our large feed reserves in the ever-normal granary into food for defense.

This whole general program for increased food-for-defense has been augmented and considerably stimulated since it was announced last April 3. We have discovered, for example, that the British need a large amount of dairy products. Concentrated foods that require less shipping space and less refrigeration are what the British need. This need, coupled with the food habits of the British people, naturally has led to a large demand for cheese, evaporated milk, and dry skim milk from the United States.

The production program also has been broadened to include more soybeans for oil; production of a supply of adapted castor bean seed for use if or when we have to supplement our normal imports with domestic castor bean oil, and similar variations to meet the apparent and prospective needs.

We are fully aware that in order to produce the needed farm products, agriculture must have the equipment, implements, and service to carry out its work. Consequently one of the most important jobs of the Office of Agricultural Defense Relations is to present agriculture's case before the defense officials who are responsible for granting priorities for metals, chemicals and other strategic materials. We soon discovered that this was largely a matter of understanding, and as soon as the priorities officials understood why agriculture needed certain things, we received the fullest sympathy and cooperation.

This sympathetic attitude does not mean that we can expect to get for agriculture everything we want or need. Priorities and rationing, which may be expected to expand greatly as our defense program develops, are already affecting poultry equipment, milking equipment, fencing, steel grain bins, tractors, and some farm machinery. Nitrates, the basis for explosives as well as for fertilizers, may be affected soon. Other chemicals and drugs for insecticides, fungicides, and disinfectants are likely to be short. The shortage of farm labor, the increased cost of things farmers buy, and all of the other things that make up a war-time economy must be faced by farmers planning for the future.

We can, however, be assured of one thing—that agriculture's vital part in the defense program has been thoroughly presented to defense officials. As a result, virtually all of agriculture's requirements were included in a list of 26 essential industries and services for which, on July 1, the Civilian Supply

M. Clifford Townsend.

Allocation Division of the Office of Price Administration and Civilian Supply established a priority status for repair and maintenance parts. This priorities order is designed to assure continued operation of essential industries and services which might otherwise be curtailed because of the inability to secure needed repair or maintenance parts.

The chief significance of the order is that it gives full recognition to the basic role agriculture is playing in the defense program. This is of prime importance, because many of the same strategic metals that go into a plane or a battleship are used to build or repair an incubator or a tractor.

To be assured of a sufficient supply of materials to repair and maintain the existing farm plant is in itself of great importance. Most farmers or their helpers have enough mechanical knowledge to make the normal, routine repairs necessary to keep farm equipment operating. If parts are available, the simpler farm machinery can, if necessary, be kept operating in this emergency by farmers and their hired labor.

In addition to the general priority order for repair and maintenance materials, specific cases of emergency preference ratings for agricultural needs have arisen.

(Continued on p. 111)

FARM MACHINERY AND FARMING METHODS IN SOIL CONSERVATION[1]

By L. S. CUTTER and R. A. NORTON [2]

WHEN changes are made in tillage practices, it necessarily follows that some changes in farming equipment are advisable. With the application of conservation programs to farm lands during the past few years, farm operators have faced the problem of adjusting their equipment to fit the needs of changed conditions. One of the adjustments has involved the introducing of flexibility into some of the machines to adapt them to rough and uneven ground such as terraced land. It has been proved also that some departure from conventional methods is desirable in plowing terraced land or land farmed on the contour. Difficulties such as these are perhaps not of sufficient importance in most instances to warrant discarding any particular machine in favor of an entirely new design. It is believed rather that only a few minor alterations or adjustments by the operator are necessary to adapt machinery already in use to the change in tillage operations.

[1] Cooperative research in soil and water conservation investigations, between the Office of Research, Soil Conservation Service, and Iowa Agricultural Experiment Station.

[2] The authors are cooperative agent (farm foreman), and project supervisor, respectively, Soil Conservation Experimental Farm, Clarinda, Iowa.

No. 1.—*Main harrow doubletree carried by wheels at each end to avoid dragging down of terrace crown.*

No. 2.—*Land roller, showing the flexibility that may be obtained by using machines constructed in sections.*

No. 3.—*Four-row stalk cutter has the flexibility necessary to operate efficiently on terraced land.*

The purpose of this article is to point out some of the minor changes in farm machinery that have proved helpful in farming the loessial lands in western Iowa, eastern Nebraska, and northwestern Missouri, under conservation methods. In addition, some of the farming methods used on the Soil Conservation Experimental Farm at Clarinda, Iowa, will be discussed.

Disking, Harrowing, and Rolling

In general, all tillage operations should be parallel to terrace ridges or contour lines. However, in disking cornstalk land, or harrowing for seedbed preparation, more efficient work frequently can be done by approaching these contour lines at an angle. This plan is used in disking and harrowing operations on the Soil Conservation Experimental Farm.

Flexibility is a very important factor in the disk, harrow, or roller for efficient operation while passing over terrace ridges. Disks most commonly used in this area are 14 feet in width and tractor drawn. Some are constructed in two 7-foot rigid sections, while others are constructed in four 3½-foot sections. The four-section disk provides added flexibility in passing over terrace ridges and channels.

For the same reasons, an 18-foot, four-section, flexible pipe bar drag harrow was selected for use on this experimental farm. The operation of this implement was satisfactory except that the doubletrees tended to pull down terrace ridges while passing over them, and the ends of the doubletrees would drag while harrowing parallel to the terrace ridge. This was overcome by constructing a main doubletree with wheels at each end as shown in photograph No. 1. In turn the harrow sections were attached to this doubletree, or cart, in pairs.

The land roller has been found to be very effective in preparing seedbeds for grass and legume seedings. It is important that this operation, either before or after seeding, be performed parallel to terraces or contour lines. By this method all depressions made by tractor wheels or rollers will tend to retard run-off. Photograph No. 2 shows a hookup that allows the roller to make good contact on uneven ground.

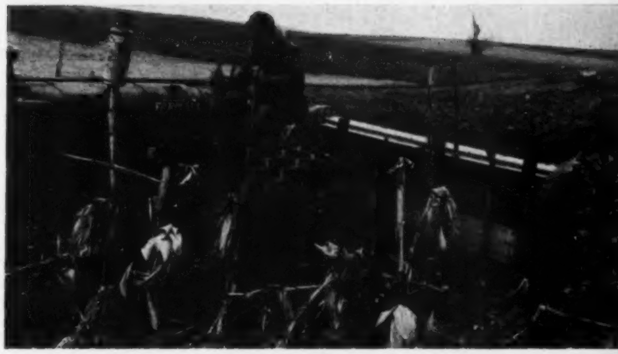
Cutting Cornstalks

In this area, stalk cutters were in common use before the disk harrow was developed. Physical discomfort to the operator caused by the uneven motion of this machine and sore necks and shoulders suffered by the teams, led to a decline in the use of stalk cutters. Many farmers turned to raking and burning their cornstalks; others substituted the disk harrow for this work.

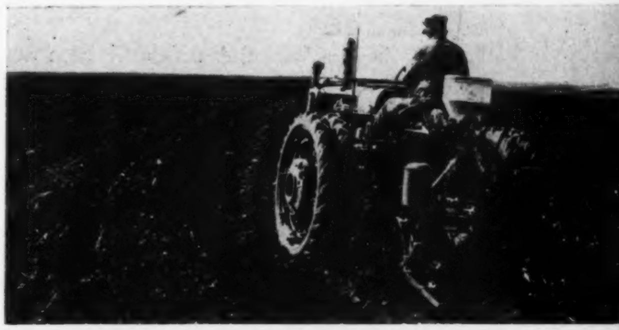
However, in recent years, so much emphasis has been placed on the value of retaining crop residues that the stalk cutter is regaining popularity. It probably is superior to the disk for chopping up cornstalks, especially where a cover crop has been seeded in the corn the preceding fall. This is true because the stalks can be worked down without excess damage to the cover crop which can be left undisturbed until plowing time.

Most of the stalk cutters now in use are homemade,

No. 5.—By rearrangement of the length of the segments of the power shaft in such a way that a knuckle of the shaft comes over the connection between the hitch and the drawbar, the binder is allowed to operate over terraces without damage to the power drive.



No. 4.—Parts of a used fertilizer spreader have been adapted fo use on this two-row lister planter. The attachment is power driven from the drive shaft in front of the operator, by use of V-belt and auxiliary shaft.



No. 6.—The addition of a shield in front of the grain drill pushe the corn stalks away from the drill so that the stalks do not damag the drill spouts. Since most of the stalks are still fastened to th ground, bunching does not occur in front of the drill disks.

and are constructed to cover three rows by using the cutter heads from old horse-drawn machines, and setting them in a rigid wooden frame that can be pulled behind a tractor. Operators have found that the tractor-drawn machines do a more efficient job of chopping because of added speed. This three-row type of machine still has one disadvantage, however, in that one section will not make contact with the ground surface when passing over uneven ground or terraced land. The machine shown in photograph No. 3 has been designed to overcome this objection. It covers four rows at a time and, as it is constructed in two sections, all blades make contact with the ground surface. The power necessary to operate this machine is less than that required to operate a disk of equal width.

Plowing

In the Missouri Valley loess region, a large percent of the tillable farm land is rolling. Plowing is a very important factor in conservation practices in this area.

Before the emphasis on water and soil conservation, plowing usually was done by starting around the outside borders of the field and working toward the center. The furrow slice was turned up or down the hill depending on the contour of the land. In certain instances some planning was done so that a maximum of furrows could be turned down-slope.

Furthermore, the dead furrow (last furrow in the center) extended either with the contour of the land, or at right angles or any angle, depending on the topography of the field. The same conditions existed for the turning areas at the corners of the field. Many operators commonly finished the plowing job by plowing out the corner turning areas, entailing double travel on these portions of the field, and leaving dead furrows at these points. Many field gullies exist today that were caused by dead furrows or by corner areas that were "plowed out."

Figure 1 shows a field of about 25 acres that was being farmed as a unit at the time the Soil Conservation Experimental Farm was established in 1931. The contour lines of the land may be seen as well as the lines representing the direction of travel of the plow by the method common to the area at the time. Note that in some instances the dead furrow and turning areas crossed the contour or level lines at rather abrupt angles. This caused concentration of water at these points and if gullies were not started, at least excess erosion occurred at these points. A check of the original map of this farm reveals that the same general conditions existed in all of the other fields being farmed at that time.

The only practical means of overcoming this difficulty, with use of the ordinary plow, was to plow in lands that conformed more nearly to the contour, but this was only partially successful because half of the furrows still were turned downhill.

In the spring of 1935, the Soil Conservation Experimental Farm began using a two-way plow. This type of plow was in common use in other sections but probably not in connection with soil conservation work.

A one-bottom, tractor-mounted type of two-way plow was selected for use on this farm. It was believed that this type of plow had two distinct advantages over the two-way, two-bottom, wheel-type plow. First, a tractor equipped with a two-way, mounted plow can be turned in practically the same radius as the tractor itself. Second, since it is desirable that all furrows be turned uphill, it was believed that more satisfactory work could be performed by operating a one-bottom 18-inch plow at some increase in speed rather than a two-way, wheel-type plow with two 14-inch bottoms which would make a full load for the tractor. Later use in the field fully justified this selection.

With the two-way plow the operator is able to make the dead furrow fall at any given point. In plowing between terraces or on contour strips all furrows may be turned uphill, to counteract the forces of erosion[3] and all turning can be done on unplowed land when plowing strips or lands of irregular widths. The two-way plow also has proved very effective in contour farming and strip cropping, as plowing operations can be made to conform to contour lines without inconvenience.

Figure 2 shows the same field as figure 1. On this chart, the contour lines of the land are shown as before, also the lines representing the direction of travel while using the two-way plow. In plowing the field by this plan the first operation is to lay out the guide furrows. In making guide furrows the plow is lowered only enough to make a mark. The areas are then plowed as numbered on the chart, and by plowing the areas as numbered the operator is able to turn a large percent of the furrows uphill. All turning may be done on unplowed land. When the field is completed, there are no dead furrows. A large portion of the work is completed without the tractor operating uphill and downhill.

A plowing plan need not be complicated and it can be made satisfactorily without the use of instruments. The main thing to remember is to plow the top of the hill first and work downhill so that all furrows are turned uphill and no dead furrow is left in the field. The average length of furrow as shown in figure 1 was 590 feet against 575 feet for figure 2. Since there is so little difference, there can be no objection to contour plowing from that standpoint.

It is interesting to note that prior to 1931 the gully in this 25-acre field was being crossed with some difficulty. Without control measures it soon would have been necessary to farm around this gully, thus dividing the field into two lands and reducing the average furrow length to about 398 feet. Variations from these figures will occur in different fields, depending on shapes and sizes, but this field appears to be typical of this farming area.

There is a further advantage to contour plowing, as with other contour tillage practices in this area. Sidehill slopes commonly have outcroppings of subsoil layers, heavier in texture than the surface layer. Generally speaking, such outcroppings occur along the

[3] Musgrave, G. W., and R. A. Norton: *Soil and Water Conservation Investigations at the Soil Conservation Experiment Station, Missouri Valley Loess Region, Clarinda, Iowa.* U. S. D. A. Technical Bulletin 558, p. 93.

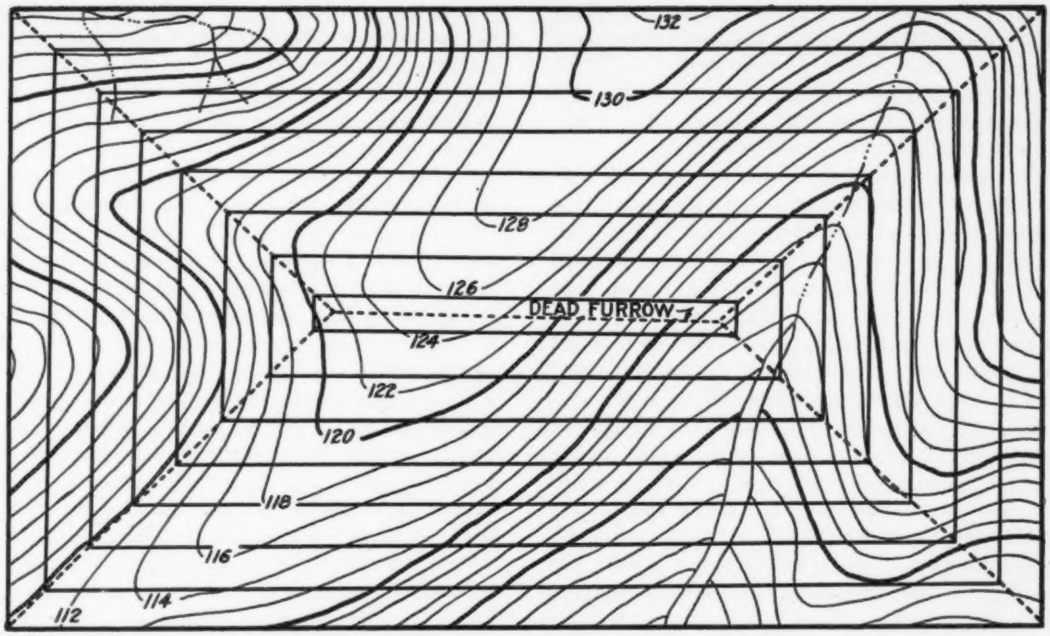


Fig. 1.—Map of 25-acre field that was being farmed as a unit prior to 1931. The contour lines of the land are shown, as well as lines representing the direction of travel of plow, using the method common to that area at the time.

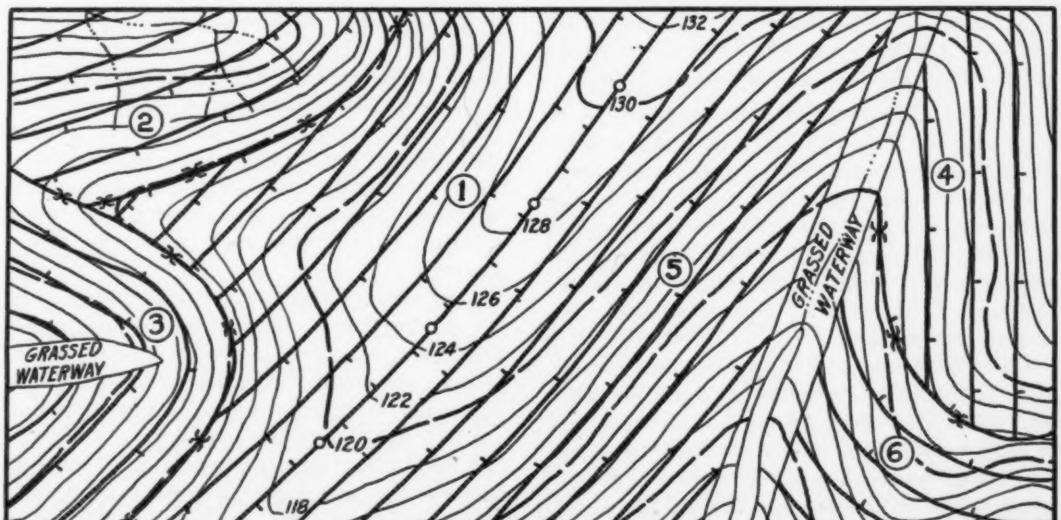


Fig. 2.—Map of same field shown in Fig. 1. On this map the contour lines of the land are shown as before. Also, the lines representing the direction of travel while using the two-way plow.

same contour line or at about the same level. In seasons of excessive rainfall, wet spots develop on these areas because of poor penetration of soil moisture and the farmer will find contour plowing convenient because he can work either above or below these areas while waiting for them to dry.

In plowing terraced areas with a two-way plow, it has been found satisfactory first to lay out a guide furrow parallel to the terrace ridge. This may be any convenient distance from the terrace crown that allows sufficient turning room for the tractor. The operator starts plowing on the crown of the next terrace above, or the field border, and works toward the guide furrow. Each time the tractor crosses the guide furrow the plow is raised. When all the area above the guide furrow is plowed there remains only an unplowed area of uniform width parallel to the terrace, and in plowing this strip the operator is able to place the dead furrow in the terrace channel. It will be noted that all furrows have been turned uphill, from the terrace channel to the terrace crown, and from the terrace channel uphill toward the next terrace or field border.

The two-way plow has been proved effective in maintaining terrace cross sections.[4] In the study at the experimental farm, it was determined that two plowings by this method, in a 4-year rotation of corn, corn, oats, and clover, are sufficient to maintain the terrace cross section without additional grading.

Corn Planting and Cultivation

A three-row tractor planter and cultivator was selected in 1931 for use on the Soil Conservation experimental farm. The most common type in use on this area was two-row equipment, but it was believed that if terraces could be constructed so that satisfactory work could be performed with three-row equipment, no trouble would be experienced with the common two-row type.

It was found that satisfactory work could be performed with the three-row type of planter and cultivator. The three-row cultivator had the advantage of being very flexible. The outer cultivator gangs were carried between the tractor support and a wing wheel, while the center gang was carried on the tractor. This feature allowed the cultivator to operate over uneven ground in much the same manner as three single-row cultivators. One principal disadvantage to the three-row cultivator was that a wider than normal space was necessary between the rows on either side of the terrace crown. This was necessary because in cultivating near the terrace crown, the wing wheel on the cultivator worked most satisfactorily when traveling exactly on the crown of the terrace. In order to meet this condition, it was necessary to place the corn rows so that the equivalent of one row was left out on the top of the terrace.

In the spring of 1939, a tractor-mounted, two-row, lister corn planter and cultivator was brought into use on the experimental farm. The planter is equipped with moldboard and loose ground lister attachments. The moldboard lister is used for planting in unplowed ground. The loose ground attachment consists of four 18-inch disks and planter shoes for planting in plowed ground. This machine was not equipped with a fertilizer distributor, but it was learned that by making certain alterations a second-hand distributor could be attached to this particular machine, as shown in photograph No. 4. This work was done in the shop at the experimental farm. The distributor was found satisfactory for applying fertilizer, particularly when used with the loose ground lister planter. The disks leave a small ridge in the center of the furrow and the fertilizer is spread on either side of this ridge. The planter shoe in turn splits this small ridge, placing the corn between the two bands of fertilizer.

For planting corn this type of planter, equipped with either the loose ground or moldboard attachment, fits in very well with conservation methods because rows may be drilled in lister furrows following contour lines. Musgrave and Norton state: "With checkrowed corn, little benefit will be gained by attempting to plant the corn in the general direction of the contour since, with this type of planting, the rows line up in either direction, and at least one cultivation is usually made at right angles to the direction of planting."

The moldboard lister has two additional advantages for planting corn as compared to the loose ground attachment. When the moldboard lister is used the ground is not commonly plowed before listing. For this reason this type is not used following a sod-forming crop; but where corn is to be planted following corn or a non-sod-forming crop, the listing operation requires only about 50 percent of the time that would be required for plowing. Furthermore, the planting is done in the same operation. Preparation of the seedbed with disk or harrow is also eliminated. Listing with the moldboard lister has the further advantage that the crop residue of the previous season is left in the surface layer of soil thereby becoming more effective in water conservation.

When planting terraced areas on the experimental

[4] Schoenleber, L. H.: *Terrace Dimension Changes and the Movement of Terrace Ridges.* Agri. Engr. 21, pp. 477–478, 1940.

farm, row number one is placed on the terrace crown of the next terrace above the area being planted—this provides the tractor with sufficient traction to avoid side slippage. This is important when planting in plowed ground with the loose ground lister attachment. The operator plants four rows parallel to the upper side of the area; then he starts parallel to the lower terrace ridge and plants uphill, making the point rows fall adjacent to the upper side of the terrace area. One reason for this placement of point rows is that the least possible difficulty is involved in turning with the cultivator at this area. Another reason is that it allows a greater percentage of the rows to be parallel with the terrace channel. Point rows ending in the terrace channel would tend to concentrate run-off thereby forming bars of soil in the channel. With the two-row equipment it is also possible to attain an even spacing of rows over a terrace ridge.

As to placement of rows in contour strips or contour fields, it has been found that, in general, rows should have slight drainage toward grassed waterways or field borders. Because of variations in land slope, width of strips, or locations of grassed waterways, it is difficult to devise a general rule that will work satisfactorily for all fields, but with these problems in mind, the operator can contrive means to fit his land and his particular farm plan.

In this corn growing area there is no one standard practice of cultivation and several different machines are in common use. A number of years ago a large percent of the corn was planted with the checkrow planter, but this has changed decidedly and at the present time fully 90 percent of the corn is drill-planted. A small percent is surface-planted with small furrow openers. The greater part is now planted in lister furrows made with either the loose ground or the moldboard lister.

In cultivating corn that has been planted with furrow openers, it is common practice to use the harrow or rotary hoe for the first cultivation, and the ordinary shovel cultivator for those following. The rotary hoe did very good work on this experimental farm on ordinary land, but serious difficulty was encountered on terraced land. The rotary hoe lacked the flexibility for satisfactory operation along a terrace ridge or in a terrace channel and much damage to the crop was caused in turning for point rows. The land roller or the harrow is used ordinarily for the first cultivation of corn that has been planted with the loose ground lister: the harrow is used where the soil is mellow and in good physical condition, while the land roller is employed where the soil is cloddy. The remaining cultivations are done with the ordinary shovel cultivator.

Several different methods of cultivation are commonly used in this area where corn is planted with the moldboard lister. Many farmers use the listed-corn cultivator for the first two cultivations. Usually these cultivators, known locally as "snake killers" or "go devils," are constructed to cover two rows. Two large disks and two small shovels are employed for each row. For the first cultivation, the disks are turned so that the dirt is moved away from the row, while the two shovels run in the bottom of the furrow on either side of the row. Thus the lister ridge is left between the rows. The second cultivation is accomplished by reversing the disks to move the dirt toward the corn, while the shovels are widened to run in the lister ridge. After completion of this operation, the ground surface is practically leveled. The third cultivation is then done with an ordinary shovel cultivator.

The listed-corn cultivator has two distinct advantages over the ordinary shovel cultivator. First, the lister ridges are preserved until the second cultivation and thus the water impounding capacity of the lister ridges is maintained for a longer period. Second, the construction of this machine is such that it gives very little trouble even though large amounts of crop residues are present in the soil.

Another method of cultivating corn that has been planted with the moldboard lister is by use of the ordinary shovel cultivator for all cultivations. Usually the cultivator is equipped with common shields; or, the box shield of the listed-corn cultivator is adapted to the shovel cultivator. The four-shovel cultivator is more popular than the six-shovel type because the former operates more effectively through crop residues or "trash."

Most of the cultivation of corn on this experimental farm is done with the ordinary type of shovel cultivator. One exception is found where the corn is ridged at the time of the last cultivation. When rows are planted up and down hill most operators attempt to leave the ground surface as level as possible following cultivation, to avoid formation of small gullies between rows. On the other hand, when cultivating is done along contour lines it is advantageous to leave the ground uneven. Musgrave and Norton found that on an 8-percent slope an impounding capacity of two surface inches of water was possible without excessive ridging of corn rows. Thus, in contour farming, ridging of corn rows is a distinct advantage for soil and water conservation.

The first work with a grain binder over terraced land on the experimental farm proved rather difficult. In the beginning it was thought that most satisfactory work could be done by cutting each individual terrace area as a unit. Later another plan was tried—cutting along the sides of the field and driving across the ends of the terraces with the machine out of gear. Both plans involved some difficulty in operation of the machine and also required additional labor. When each terrace area was harvested as a unit, additional back cutting was necessary, causing some waste of grain and extra labor in carrying the bundles from the next area to be cut. Also in cutting the area adjacent to the terrace ridge the bundle carrier would drag so that it could not function properly. Several times, damage to the power-drive mechanism occurred in passing over a terrace when traveling from one area to another or in cutting around the entire field.

Prior to the beginning of the 1937 harvest season, an effort was made to find a more satisfactory method of cutting grain over terraced land. It was found that by modifying the design of the hook-up between the tractor and the power-binder the machine could be operated over terraces without damage to the power drive. The modifications consisted of rearrangement of the length of the segments of the power shaft in such a manner that a knuckle of the shaft would come directly over the connection of binder hitch and tractor draw bar, as may be seen in photograph No. 5.

After these changes had been made it was possible to cut around the entire terraced field, crossing the terraces at any angle. The only requirement is that it is better to approach the terraces in such a manner that the grain wheel on the outer end of the binder platform leads toward the terraces rather than following the remainder of the machine over them. If terraces are so placed on a field that, in cutting grain, the grain wheel does not approach the terraces in this manner, the sickle guards will occasionally catch the terrace crowns, but this situation can be remedied by cutting the field into two parts, cornerwise.

It is believed that a little ingenuity on the part of the operator is all that is necessary to ensure satisfactory operation of a power binder on practically any terraced field.

The practice of seeding cover crops in the fall following the first year of corn, in the 4-year rotation of corn, corn, oats, and clover, has been applied on the Soil Conservation Experimental Farm. It is believed that the ideal method of seeding is by the use of the one-horse grain drill which can be run through the corn some time in August. In this area, however, corn plant growth usually is heavy, and storms sometimes cause considerable lodging so that drilling in the corn cannot be done. When these conditions exist and in seasons when the corn can be harvested early, cover crops can be seeded following the corn harvest with reasonable success. This seeding operation has been done with the ordinary grain drill equipped with a plank shield, shown in photograph No. 6.

The plank shield on the grain drill pushes the stalks forward so that they do not damage the drill mechanism, particularly the grain spouts. Likewise, since the cornstalks are still fastened to the ground, the drill passes over them without the bunching that might occur if the field was disked or harrowed preceding the seeding operation; and, incidentally, the labor of these operations is eliminated. Furthermore, if the seeding is done in the standing cornstalks the growth is left in better shape to hold winter snow than if the field were disked.

Recent developments in the reduction of grain crop acreages have favored spring seeding of sweetclover on cornstalk land without a nurse crop. Farmers may find that the drill equipped with a shield is a very effective tool for this seeding operation. Probably the seedbed would be in better condition for clover seeding than where the soil is stirred with a disk.

GOOD NEWS FOR SHEEPMEN

There is a new chemical—phenothiazine—that does away with much of the work, worry, and expense that used to go with producing lambs reasonably free of internal parasites. On badly infested pastures it has been necessary to dose each lamb individually, sometimes as frequently as every 2 or 3 weeks. The parasitologists of the Bureau of Animal Industry have found that winter cold kills most of the parasites on pastures, but that the ewes carry them through the winter and reinfest the pastures in the spring.

By mixing this newly discovered material—phenothiazine—in the ewes' feed in the winter, they may be made so free of their parasites that the lambs need be treated only once—maybe not at all.

Farmers should know about this new treatment for sheep parasites. Healthy sheep constitute an important factor in making profitable use of farm pastures; and greatly increased acreages of farm pastures are needed to protect and improve the soil and reduce the cost of livestock production. Sheep also are admirably adapted to provide farm families with the increased supply and variety of fresh meat that is sorely needed in our national defense program.—A. T. Semple.

The Bingham farm herd grazing on the irrigated pasture, against background of farm buildings and rough, brushy range lands.

THE VALIMONT FARM

By D. G. CRAIG [1]

THIS farm, 6 miles west of Morgan, Utah, in the fertile Weber River Valley, is owned and operated by Annie, Francis, and Amos Bingham. It now contains 81.6 acres of irrigated farm land equal to the best in the valley. Yields as high as 125 bushels of barley, 5 tons of alfalfa hay, 30 to 40 tons of cabbage, and 18 to 25 tons of sugar beets to the acre are not unusual in the valley from land such as occurs on this Utah ranch that goes by the name "Valimont Farm." In addition to the irrigated land the farm contains 769 acres of native range pasture and 16 acres of native meadowland.

The farm was purchased by the Binghams in 1922, at which time it was in a run-down condition with its crop-producing capacity low. The cultivated lands were low in fertility and their topography so uneven that they could not be cultivated and irrigated properly for production of maximum crop yields. The range lands also were in rather poor condition, and with further continuous over-use they deteriorated to a still greater extent. From 1922 to 1933 the Binghams used the range land for grazing by beef cattle.

By 1933 the Binghams had fully decided that a diversified agriculture that would make possible the utilization by livestock of all feed raised on the farm would be the most profitable organization for acreage such as the Valimont Farm. Thus it was that the farm lands were gradually leveled and put into better condition so that they could be used for the growing of feed crops such as barley and alfalfa.

At the time of reorganization the farm operations were pointed toward the gradual building up of a good milking strain of Shorthorns. A little at a time this herd of Shorthorns is being improved and increased in numbers while the grade cattle are being eliminated. The Binghams soon learned, however, that the native range pasture, covered for the most part by browse species such as sagebrush and scrub oak, was unsatisfactory for this better type of livestock. The steep range lands were hard on these dual-purpose cattle, and much work was involved in their care and proper management while on the range. The brushy vegetation injured the udders of several of the better cows, and profitable milk and butterfat production proved impossible, even with a supplementary ration of hay and grain.

The Binghams became convinced that some other arrangement must be made for pasture. They were reluctant to convert any of their most fertile farm land to pasture, but they decided to try a small acreage as an experiment. Thus in 1938, with the assistance of the Soil Conservation Service, 4 acres (field 5a on the accompanying land-use map) of the best soil on the farm were planted to a grass-legume mixture consisting of the following species:

	Pounds
Smooth brome (*Bromus inermis*)	4
Kentucky bluegrass (*Poa pratensis*)	4
Orchard grass (*Dactylis glomerata*)	3
Meadow fescue (*Festuca elatior*)	4
Perennial ryegrass (*Lolium perenne*)	3
White Dutch clover (*Trifolium repens*)	3
Alsike clover (*Trifolium hybridum*)	2

[1] Assistant chief, regional agronomy division, Southwest Region, Soil Conservation Service, Albuquerque, N. Mex.

This mixture was seeded with a grain drill at the rate of 23 pounds to the acre.

The pasture was grazed by the farm herd in 1939. The small 4-acre tract adequately pastured 15 mature, high-producing milk cows during the growing season. Grazing was commenced May 1 and ended September 30. In 1940, 20 head of dairy cows obtained 80 cow months of grazing from the small irrigated pasture; the grazing was in the late spring, summer, and fall months. The milk cows were fed, in addition to the pasture, a small amount of grain and were offered alfalfa. As a general rule they refused the alfalfa, as the forage from the irrigated pasture was sufficient to satisfy their forage requirements. This is in direct contrast to the situation that existed before the irrigated pasture was available when the cattle, while utilizing the native range, consumed several tons of supplementary feed in the form of alfalfa hay, as well as a considerable amount of grain.

The 4-acre pasture is divided into two equal parts which are grazed alternately. The general plan is to irrigate each tract at intervals of 2 weeks. One tract is irrigated and given a rest, while the other part is being grazed by the entire farm herd. This procedure is repeated at regular intervals throughout the grazing season. Such a system of management prevents injury to the pasture from trampling while the soil is wet and unfirm following irrigation. For the same reason the cattle are removed from the pasture for a short period after heavy rains. This is an important part of the management of irrigated pastures.

The system of farm management which has been instituted by the Binghams has resulted in the several benefits outlined below:

1. Crop yields have been decidedly increased as a result of conditioning of the land through leveling, the institution of proper cultural practices, and use of large quantities of barnyard manure to improve fertility of the soil.

2. Cash crops are no longer grown. Hay, grain, and pasture crops comprise the rotation. None of the crops are sold—they are all fed to livestock on the farm. Each year several head of steers are fattened for market. During the winter of 1940–41, 80 head were fed. This feeding program requires large quantities of purchased feed over and above that raised on the farm. Consequently, many additional tons of barnyard manure are produced to be applied to the cultivated lands to maintain and improve fertility.

3. Addition of irrigated pasture has made it possible to reduce the grazing pressure on the already overgrazed range lands to a point below their actual carrying capacity. As a result, a decided improvement of these lands is noticeable after only 1 year of grazing below actual carrying capacity.

4. The labor required to handle the farm herd has been greatly reduced. Instead of searching over 769 acres of rough, brushy country for the farm herd each day it is only necessary to walk a short distance to the irrigated pasture where the animals are easily obtainable.

5. The Bingham herd has come to be one of the highest producing herds in the Weber River Valley according to the Herd Improvement Association. The production in 1940 averaged 345 pounds of butterfat per cow for the entire herd of 17 producing cows. Accordingly, the association has also found that the Bingham herd is one of the most economical from the standpoint of production in the entire valley.

6. No udder injuries have occurred since the irrigated pasture has been substituted for the brushy range.

7. During the growing season, a saving is made in feed. The use of the pasture makes unnecessary the feeding of supplementary forage in the form of alfalfa hay to the milking cows.

The development of good pastures is fast becoming a part of the farming practice on the dairy farms of Morgan County. Fifteen new pastures were started on farms that in past years had no improved pastures. Records kept by some of the good dairymen indicate that these better pastures have had a carrying capacity of four cows per acre where small amounts of grain are fed, and probably a little hay, during milking time. With no supplemental feeding, some of these pastures have furnished ample feed for three cows per acre. Rotation pasture is the practice in most cases. These records indicate a return of $100 to $120 per acre in butterfat produced. No other crop under present conditions is giving better results. The difference in labor costs of harvesting pastures and other crops has not been considered.

Farmers in the Weber River Valley have been reluctant to plant pasture mixtures on their better land, thinking that the income from pasture could not equal that from the truck crops commonly grown. The Binghams shared that feeling at first, but after 2 years' experience they maintain that irrigated pastures properly handled will produce a net return fully equal to that from any crop adapted to this area.

As a result of their experience the Binghams have instituted a more vigorous herd improvement program. They recently purchased three cows of nationally recognized milking Shorthorn lineage. These three cows, Elmdale Lucy, Northview Lady Waterloo, and Northview Alma, will form the basis of the future Valimont Farm herd.

Land-use capability map, Valimont farm, Morgan, Utah.

BUILDING A SOIL CONSERVATION PROGRAM THROUGH GROUP ACTIVITIES

By JOHN W. FORD, Jr.

"LIFE is so short—and there is so much to be done!" An old man once said that to me and the thought has grown into a philosophy of life and of work.

Because "life is so short," we cannot spare time for unsound or unworthy objectives. This is certainly true with the county agent who has so many opportunities to "chase rabbits." We want to know that any project which is given precious time is one which, carried to successful conclusion, will benefit mankind.

When a new agricultural plan comes along, farmers and county agents like to try to pick it apart, to find the bugs in it, and decide how we think it will work.

There is a story about a farmer who had a couple of boys who were also pretty curious about new contraptions. Whenever this farmer came back from town with some new piece of machinery like a cotton planter, or a fertilizer drill, or a clock, the boys right away took the thing all apart to see what made it work.

One day the farmer got back from town in his wagon, and the boys rushed out to see what he had brought with him this time. The old fellow got out of the wagon, dropped a great big anvil on the ground, and growled, "There, gol darn ye, let's see you take *that* apart!"

Well, when this soil conservation district program came along, we found it was so sound we couldn't pick it apart. They had given us an *anvil.*

Each year before going to the Extension Program Planning Conference we of Autauga County get with our county planning committee and reexamine situations and objectives. "In a multitude of council is wisdom"—and a lot of good cooperation later on! This committee helps us keep our feet on the ground and brings us back each year to soil conservation as being fundamental. So we build our extension program again around that objective, offering our help again to the soil conservation district supervisors, requesting extension specialist help accordingly, and determining again to use the AAA program and our Extension organization and Farm Bureau as working tools for the purpose of conserving and building up the land and the forest to the end of better living for our people. So if life is short, at least we are spending it wisely.

Now, because "there is so much to be done," we have to employ group action to get a worthwhile volume of accomplishment.

Our officers of community organizations were constituted committees on priority in the first year of district work in the county. This gave us some prime cooperators, geographical spread, and right locations of farms to serve as demonstrations. That objective reached in the first winter of operation, we came back and developed reasonably solid blocks of farms for district treatment and, by employing the group school method, increased both volume and effectiveness of technical help.

By last March we had a lot of interesting things showing up on cooperating farms and going to waste from the standpoint of their educational value for other people. Too, we realized that in order to get maximum spread of practice we would have to take people to see the things that are done on these farms, so we started holding tours. From the first of March until September first we conducted a "Friday farm tour" each week. These tours were attended by an average of thirty-four farmers and on several occasions by classes in vocational agriculture. Although scheduled and arranged by the technician and county agent, the "Friday farm tour" was the host farmer's own party and he did most of the talking.

We can trace a vast amount of "spread of practices" to the "Friday farm tour" program—but we discontinued it in September.

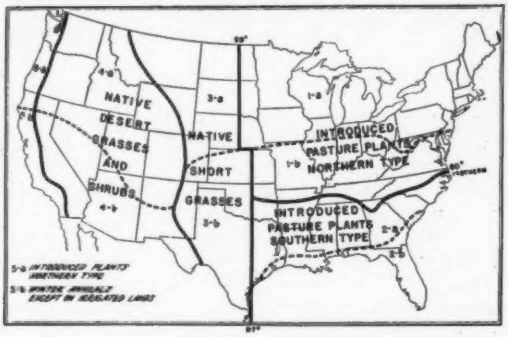
A month or so ago the "Friday demonstration," successor to the "tour," was born. As long as farmer interest justifies, we will be helping some cooperator each Friday afternoon set kudzu or plant pines or build slip-scrape terraces, we friends of his from miles around.

"Life is short," so we are working on fundamentals. "There is so much to be done," so we are getting many and many an extra hillside wrapped up by working with people in groups.

Glennon Loyd, in an article to appear in the November issue, writes about "A Pasture That Does Not Take 'Annual Leave.'" It is in a farm near Spring Valley, Minn.

Editor's note.—The remarks quoted are abstracted from a paper presented at the meeting of the Soil Conservation Section, Association of Southern Agricultural Workers, 42nd Annual Convention, February 6, 1941, at Atlanta, Ga. The author is County Agricultural Agent, Prattville, Ala.

SUGGESTIONS FOR PASTURE MIXTURES TO MEET VARYING CONDITIONS



II

***Q.**—I want to establish a soil-conserving, profitable pasture in the east-central part of the United States. What type of mixture shall I use?*

East-Central States (section 1-b of the map)

Mixture for good, well-drained soils:

	Pounds per acre
Kentucky bluegrass	5 or 6
Orchard grass	4 or 5
Timothy	2 or 3
Redtop	2
Lespedeza	6 or 7
White clover	1 or 2
Total	20 or 25

Mixture for poor, well-drained soils:

	Pounds per acre
Orchard grass	5 or 6
Tall oatgrass	4 or 5
Redtop	4 or 5
Lespedeza	7 or 9
Total	20 or 25

Mixture for wet, poorly drained soils:

Timothy	5 or 6
Redtop	8 or 10
Alsike clover	3 or 4
Total	16 or 20

Mixture for wet, poorly drained soils where meadow foxtail is preferred:

Meadow foxtail	4 or 5
Redtop	8 or 10
Alsike clover	4 or 5
Total	16 or 20

In the northern part of this section the Korean lespedeza should be used. In the southern part, Common, Kobe, or Tennessee 76 are best. Good results are obtained from a mixture of Common and Korean in Tennessee and North Carolina.

AGRICULTURE'S CLEARINGHOUSE FOR DEFENSE ACTIVITIES

(Continued from p. 99)

One was the granting of an emergency rating on sheet steel to be used in the construction of grain bins needed by farmers facing a serious shortage of storage space. Another was the granting of a high preference rating to deliveries of materials needed by plants constructing or repairing canning equipment and machinery. This was done in order to prevent possible loss of a portion of the 1941 fruit and vegetable crop.

It is reasonable to believe that in the future—when we can present a real case for the need—similar attention will be given other agricultural necessities. On the other hand, there are many things for which we may have to devise substitutes, or even get along without them altogether. It all depends on the needs of our armament program and its importance as weighted against the needs of agriculture and the other industries classified as "essential."

Further evidence of the importance of the farmer in the defense picture may be found in the fact that agriculture has full representation on the commodity groups established in the Office for Emergency Management. This means that in the production, allocation and use of strategic materials, agriculture has a full voice in the proceedings as they apply to materials that affect agriculture.

All of these things go hand-in-hand with agriculture's responsibilities in national defense. In order to have a united and coordinated administrative channel for defense activities, Secretary Wickard has established a United States Department of Agriculture Defense Board in every State and every county. These boards are made up of representatives from each of the Department agencies whose services are needed by the Secretary to administer actions necessary to carry out departmental responsibilities in national defense.

BOOK REVIEWS AND ABSTRACTS

by Phoebe O'Neall Faris

FACTORS OF SOIL FORMATION. By Hans Jenny. New York and London. August 1941.

Here is a somewhat revolutionary book that goes deeply into the study of soil properties and correlation of soil-forming factors with those properties. The author, who is Professor of Soil Chemistry and Morphology, University of California, is of the opinion that any true advancement in the fundamental knowledge of soils will involve an organization of the data by laws and theories, in addition to classifications. He hopes that such a mode of approach will assist in the understanding of soil differentiations and will help to explain the geographical distribution of soil types. The soil-forming factors treated in great detail are topography, time, parent material, climate, and organisms.

The formulary method used by Professor Jenny to show functional interrelationships of properties in the soil system serves to put this volume definitely in the class of an advanced text on theoretical soil science. Symbols are used throughout to indicate soil forming factors and soil properties as related to differentiations in the state of the soil system. The plan of the book, and the "new concept of soil-forming factors" are explained quite thoroughly in the opening chapters; likewise, no doubt for soil surveyors in particular, the terms and symbols adopted to represent the "independent variables" necessary in considering the soil as a dynamic system are explained at the beginning and throughout this treatise. Soil surveyors are urged by the author to place more stress on soils data having to do with these "variables"—climate, organisms topography, parent material, time—and, what is more, they are instructed in the use of such data in making soils histories, classifications and analyses.

The main part of the book is devoted to chapters treating separately the five soil-forming factors and their relationships in soil knowledge. Apparently Professor Jenny's idea is that soils geographers and soils "functionalists" should correlate knowledge and data in the interests of a far broader scope of knowledge regarding the earth's soil system and a more accurate assemblage of practical information. Other sciences too are discussed as having tremendous potential bearing upon soils research—plant ecology, climatology, geomorphology in its erosion and denudation aspects, the various geological sciences, even the social sciences.

In the chapter on climate as a soil-forming factor, one finds many thought-provoking theories, expressed occasionally in the form of queries, or as criticisms of more or less established methods of collecting and assembling data. This long chapter is divided into four sections treating in detail the important soil-forming variables, moisture and temperature, the interplay of the two in influencing soil formation, and the distribution and groupings of soils according to these two climatic subfactors. To a large extent this part of the book consists of an assemblage of principles, laws and theories of the great climatologist-pedologists of the world—Thornthwaite's moisture classification, Crowther's percolation factor, Hilgard's studies of soils from the arid and humid regions of the United States; Van't Hoff's temperature rule and Ramann's weathering factor, Latimer's data on chemical composition of podsol soil, Bennett and Allison on the laterite profile; and, of course, Marbut's Atlas, quoted throughout the volume.

Russia and the United States are the two great territories featuring most extensively throughout Professor Jenny's scholarly treatise. Russian pedologists are allotted considerable space for their careful and extensive soil classification work; but the final chapter, dealing with organisms as a soil-forming factor, becomes somehow rather more an American contribution both in idea and in areas of experimental achievements. In this chapter the author greatly clarifies the role of vegetation in soil formation by assigning to plants a dual role involving both the dependent and the independent variable. The latter role brings out considerable recently acquired information on plant succession and soil formation, transition zone profiles, chemical composition of plants as related to profile features under forest and under cultivation, the effects of cropping, burning, irrigation, etc., upon soil formation, and soil productivity and fertility trends under average farming conditions. Professor Jenny does not go deeply into the subject of soil micro-organisms for the reason that his book is "a treatise on soil-forming factors and does not undertake to study soil-forming processes."

The extensive bibliographies included at the ends of chapters serve to round out the logical frame of this critical discussion of a most important subject.

SOILS AND SOIL MANAGEMENT. By A. F. Gustafson. New York and London. 1941.

Professor Gustafson follows up his book "Conservation of the Soil" with this text on economical use of the soil for production of crops that can be turned into adequate income. Should this new volume become widely used as a textbook in agricultural colleges it will no doubt find its way into many a farm home library—students will put it aside as a book to be kept throughout years o actual farming experience. Some of the chapters contain information adaptable to actual field farming; while the book as a whole will serve very well to help the farmer to an understanding of the land he tills.

The author gives special attention to the following: soil organisms and the organic matter of mineral soils; the various means of controlling water in the soil; tillage, with special reference to implements; erosion and its control; soil acidity and liming; management of alkali soils; maintenance of nitrogen in the soil; the production, conservation and utilization of farm manures; green-manure crops; fertilizers and their use; the rotation of crops; long-term maintenance of mineral soils' productivity; reclamation and fertilization of peat and muck soils.

Leading article in the November issue is by Harry L. Carr and G. E. Ryerson, "Tooling Up for Soil Conservation." It is observed by the authors that "As progress in soil conservation techniques has brought changes in agricultural practices, farm equipment men have developed new machines and altered old ones to meet the new demands."

U. S. GOVERNMENT PRINTING OFFICE: 1941

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Compiled by ETTA G. ROGERS, Publications Unit

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[1] From Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

FISHING is one of the most ancient of all human occupations, but in silt-charged waters the most patient fisherman will rarely get even a nibble. Sunlight is essential for the production of fish food, but light cannot penetrate far into muddy water. Hence, a farm pond is likely to be really productive of fish only on a farm properly organized and operated to conserve soil.

In a pond everything alive is good eating to some organism or another, and the fish are fine food for man himself. Upon the phytoplankton—myriad, floating, microscopic plants—live the swarming millions of minute animals, fed upon by small fish that are devoured in turn by larger ones. All pond life depends ultimately upon the phytoplankton, which, like other green plants, requires sunlight to manufacture food. Some of these minute but important plants are figured on the front cover, drawn 200 times their natural size.

As with livestock, fish can be produced better by fertilizing the plants upon which they feed. This method has long been used in Europe where more meat per acre is obtained by fish culture than by livestock farming. Potentially enormous quantities of high-quality food can be produced in the thousands of ponds on American farms. —W. R. VAN DERSAL